

CLAIMS

1. A paper handler comprising:

an acceleration conveyor including an acceleration belt operating at
an acceleration speed; and

5 a pinning structure operably positioned to pin paper to the
acceleration belt.

2. The paper handler of claim 1, wherein the pinning structure is a rotary
feeder positioned above the acceleration belt.

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3. The paper handler of claim 2, wherein the rotary feeder is contacting the
acceleration belt.

4. The paper handler of claim 2, wherein the rotary feeder comprises a
15 plurality of flexible bristles extending radially from a roller.

5. The paper handler of claim 2, wherein the rotary feeder has an outer surface rotating at a rotary surface speed, and wherein the rotary surface speed is less than the acceleration speed.

5 6. The paper handler of claim 5, wherein the rotary surface speed is approximately two-thirds of the acceleration speed.

7. The paper handler of claim 6, wherein the acceleration speed is approximately 1200 ft./min.

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8. The paper handler of claim 1, wherein the acceleration speed is sufficiently high to create a suction phenomena such that when paper is pinned to the acceleration belt the paper will be accelerated to a paper speed substantially equal to the acceleration speed.

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9. The paper handler of claim 8, wherein the acceleration speed is at least 800 ft./min.

10. The paper handler of claim 9, wherein the acceleration speed is approximately 1200 ft./min.

11. The paper handler of claim 1, wherein the acceleration speed is at least
5 1000 ft./min.

12. A paper handler comprising:

an acceleration conveyor adapted to receive paper and accelerate the
paper to a predetermined speed, wherein the acceleration conveyor
10 includes an input end, an output end, and an acceleration belt; and

a catching structure proximate the input end, wherein the catching
structure includes a downwardly inclined catching plate to facilitate
delivery of paper to the acceleration belt.

13. The paper handler of claim 12, wherein the catching structure comprises
15 a plurality of rods projecting downwardly in a general direction toward
the catching plate and the acceleration belt.

14. The paper handler of claim 12, wherein the predetermined speed is higher than a feed rate at which the acceleration conveyor receives paper.
- 5 15. The paper handler of claim 12, wherein the acceleration belt operates at a speed of at least 1000 ft./min.
16. A paper handler adapted for use with a device, the paper handler comprising:
- 10 an acceleration conveyor adapted to feed paper to the device at a predetermined speed;
- a product conveyor downstream of the acceleration conveyor;
- a transition between the acceleration conveyor and the product conveyor; and
- 15 a blowing system operatively positioned to facilitate carrying the paper across the transition at a speed substantially equal to the predetermined speed.

17. The paper handler of claim 16, wherein the device is a sorter comprising a sensor and an ejector, wherein the ejector is downstream of the sensor and operably positioned to eject targeted paper crossing the transition.
- 5 18. The paper handler of claim 16, wherein the blowing system comprises a blower and a plenum chamber operably connected to the blower to create a vacuum downstream of the transition.
- 10 19. The paper handler of claim 18, comprising a housing for the product conveyor and through which the vacuum creates an air flow flowing at air speed, wherein the housing has an interior cross section such that the air speed is higher near the transition than further downstream of the transition.
- 15 20. The paper handler of claim 16, wherein the product conveyor comprises:
a transition end proximate the transition; and
a transition plate above the transition end.

21. The paper handler of claim 20, wherein the transition plate is curved to conform to the product conveyor transition end.

22. The paper handler of claim 16, wherein the product conveyor comprises
5 a transition end below the acceleration conveyor.

23. The paper handler of claim 22, wherein the acceleration conveyor comprises a device end and the product conveyor transition end is downstream of the device end.

24. The paper handler of claim 16, wherein the blowing system creates a vacuum drawing air across the transition.

25. The paper handler of claim 16, wherein the vacuum draws air through
15 the transition.

26. The paper handler of claim 16, wherein the acceleration conveyor operates at a speed of at least 1000 ft./min. and the predetermined speed is at least 1000 ft./min.
- 5 27. The paper handler of claim 16, wherein the acceleration conveyor comprises a pinning structure upstream of the device.
- 10 28. The paper handler of claim 27, wherein the acceleration conveyor comprises a belt, and the pinning structure comprises a rotary feeder contacting the belt.
29. The paper handler of claim 28, wherein the blowing system creates a vacuum drawing air across the transition.
- 15 30. The paper handler of claim 16, wherein:
the acceleration conveyor comprises a separation region at which the
paper separates from the acceleration conveyor;

the product conveyor comprises a reception region downstream of the transition wherein the product conveyor receives a majority of the paper crossing the transition; and

5 the transition comprises a transition plane intersecting the separation region and the reception region, wherein the transition plane is at a transition angle measured relative to the acceleration conveyor, and wherein the transition angle is between 15° and 60°.

10 31. The paper handler of claim 30, wherein the transition angle is approximately 30°.

32. The paper handler of claim 16, wherein the acceleration conveyor is horizontal.

15 33. A method of handling paper comprising the steps of:
receiving paper at an input end of an acceleration conveyor;
accelerating the paper to a predetermined speed; and

operating a belt of the acceleration conveyor at a sufficiently high speed to create a suction phenomena, wherein the paper is accelerated to a paper speed substantially equal to the belt high speed.

5 34. The method of claim 33, wherein the step of operating a belt comprises operating the belt at at least 1000 ft./min.

35. The method of claim 33, wherein the belt high speed is substantially equal to the predetermined speed.

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36. The method of claim 33, wherein the step of accelerating the paper comprises the step of pinning the paper to the belt.

37. The method of claim 36, wherein the step of pinning the paper comprises
15 the step of reducing unwanted interference to the paper stream due to a speed discontinuity between a pinning device and the belt.

38. The method of claim 37, wherein the step of reducing unwanted interferences with the paper stream comprises the step of rotating a rotary feeder.

5 39. The method of claim 38, wherein the step of rotating the rotary feeder comprises the step of rotating a surface of the rotary feeder at approximately two-thirds of the belt high speed.

40. The method of claim 33, comprising the steps of:

10 providing a product conveyor downstream of the acceleration conveyor; and

maintaining the predetermined speed across a transition between the product conveyor and the acceleration conveyor.

15 41. The method of claim 40, wherein the step of maintaining the predetermined speed across the transition comprises the step of creating a vacuum downstream of the transition and drawing the paper across the transition.

42. A method of supplying paper comprising the steps of:

receiving paper at an input end of an acceleration conveyor at an
input rate;

accelerating the paper to a predetermined speed; and

5 feeding the paper at the predetermined speed to a sensor.

43. The method of claim 42, wherein the predetermined speed is higher than
the input rate.

10 44. The method of claim 42, wherein the predetermined speed is at least
1000 ft./min.

45. The method of claim 42, wherein the step of receiving paper at the input
end comprises catching the paper on a catching plate and allowing the
15 paper to slide onto an acceleration belt.

46. The method of claim 45, wherein the step of receiving paper comprises allowing the paper to impact a plurality of rods and allowing the paper to separate.

5 47. The method of claim 42, comprising the step of maintaining the paper at the predetermined speed across a transition between the acceleration conveyor and a product conveyor.

48. The method of claim 47, comprising the steps of:
10 ejecting targeted paper through the transition; and
 allowing non-targeted paper to continue downstream.

49. The method of claim 47, wherein the step of maintaining the paper at the predetermined speed across the transition comprises the step of
15 drawing the paper across the transition with a vacuum.

50. The method of claim 49, wherein the predetermined speed is at least 1000 ft./min.

51. The method of claim 49, wherein the step of accelerating the paper comprises the step of pinning the paper to the belt on the acceleration conveyor.

5 52. The method of claim 47, comprising the step of reducing back feed from the product conveyor.

53. The method of claim 52, wherein the step of reducing back feed comprises the step of operably positioning a transition plate proximate
10 the product conveyor so that the product conveyor will not back feed short falling paper.

54. The method of claim 41, wherein the step of accelerating the paper comprises the step of pinning the paper to a belt on the acceleration
15 conveyor.

55. The method of claim 54, wherein the step of pinning the paper comprises the step reducing unwanted disturbances to the paper flow by avoiding large speed differentials between the belt and a pinning device.

5 56. The method of claim 55, comprising the step of operating the pinning device at approximately two-thirds of a speed at which the belt operates.

57. The method of claim 54, wherein the step of pinning the paper comprises the step of reducing damage to a pinning device due to bulky material.

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58. The method of claim 57, wherein the step of reducing damage to the pinning device comprises the step of allowing the pinning device to flex.

59. A method of handling paper comprising the steps of:

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feeding paper to an acceleration conveyor; and
aiding transport of the paper across a transition between the
acceleration conveyor and a product conveyor.

60. The method of claim 59, wherein the step of aiding transport of the paper comprises the steps of:

creating a vacuum; and

drawing the paper across the transition.

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61. The method of claim 59, comprising the step of accelerating the paper to a predetermined speed.

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62. The method of claim 61, comprising the step of maintaining the paper at the predetermined speed across the transition.

63. The method of claim 62, wherein the predetermined speed is at least 1000 ft./min.

15 64. The method of claim 61, wherein the predetermined speed is greater than a speed at which the paper is fed to the acceleration conveyor.